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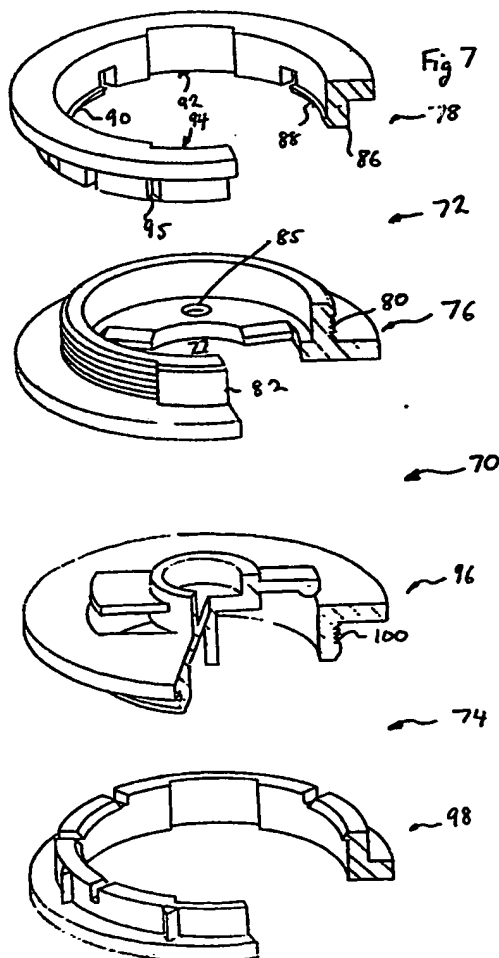
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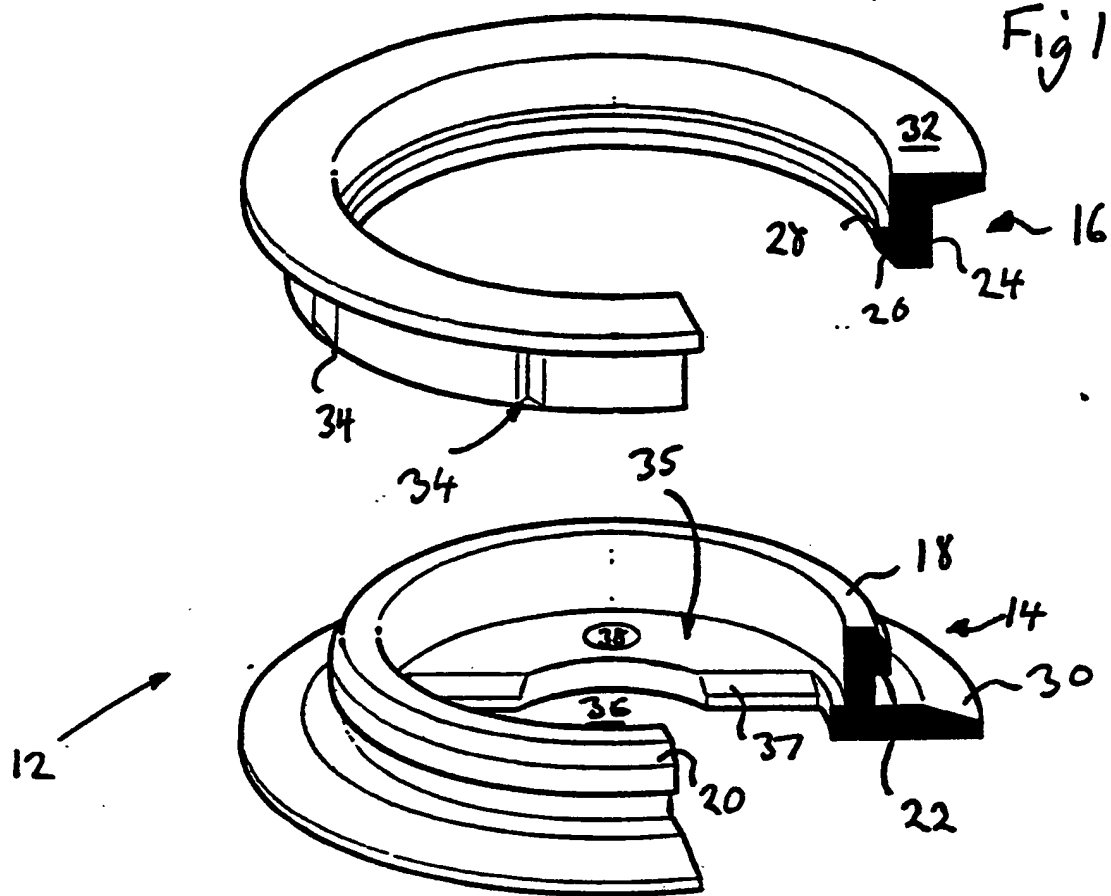
(54) A releasable connector

(57) This invention relates to a connector for releasably connecting two members, the connector comprising a first connector part arranged to be fitted to the first member and a second connector part arranged to be fitted to the second member in which the second connector part comprises two portions which are joined to fix the second connector part to the second member, one of which portions is movable to engage the first connector part to hold the members together e.g. by means of a bayonet type fastening. Each part may be formed of two interconnected portions adapted to snap fit together to accommodate different thicknesses of sheet material in which a through hole has been formed to accommodate the fastener parts.

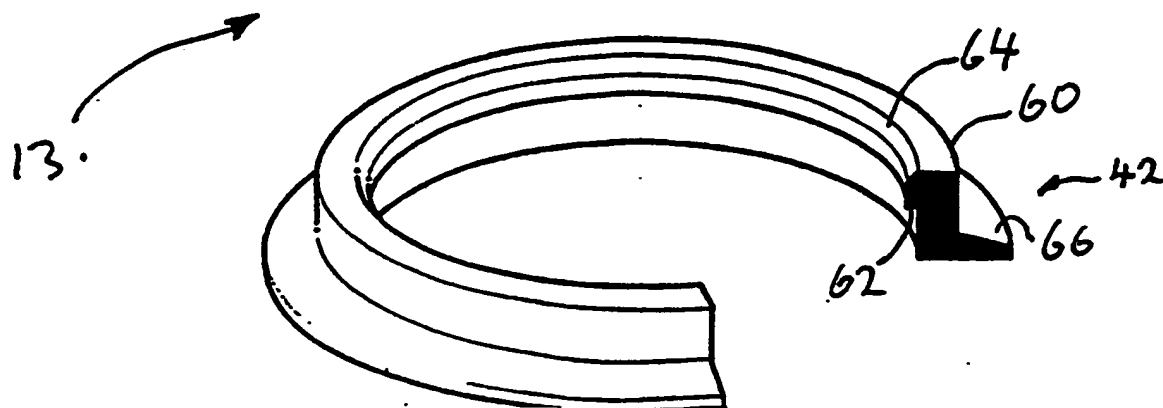
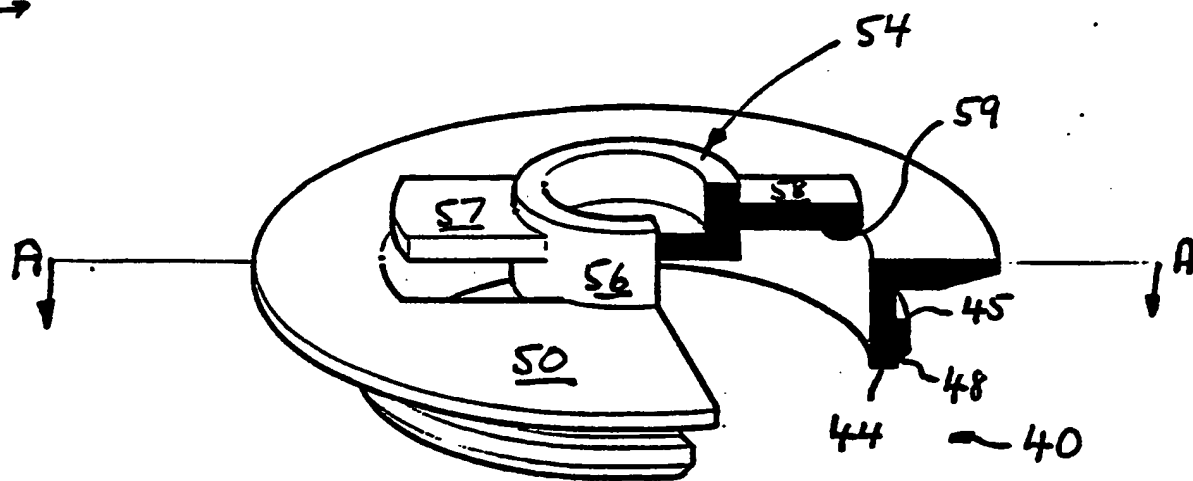


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Fig 1



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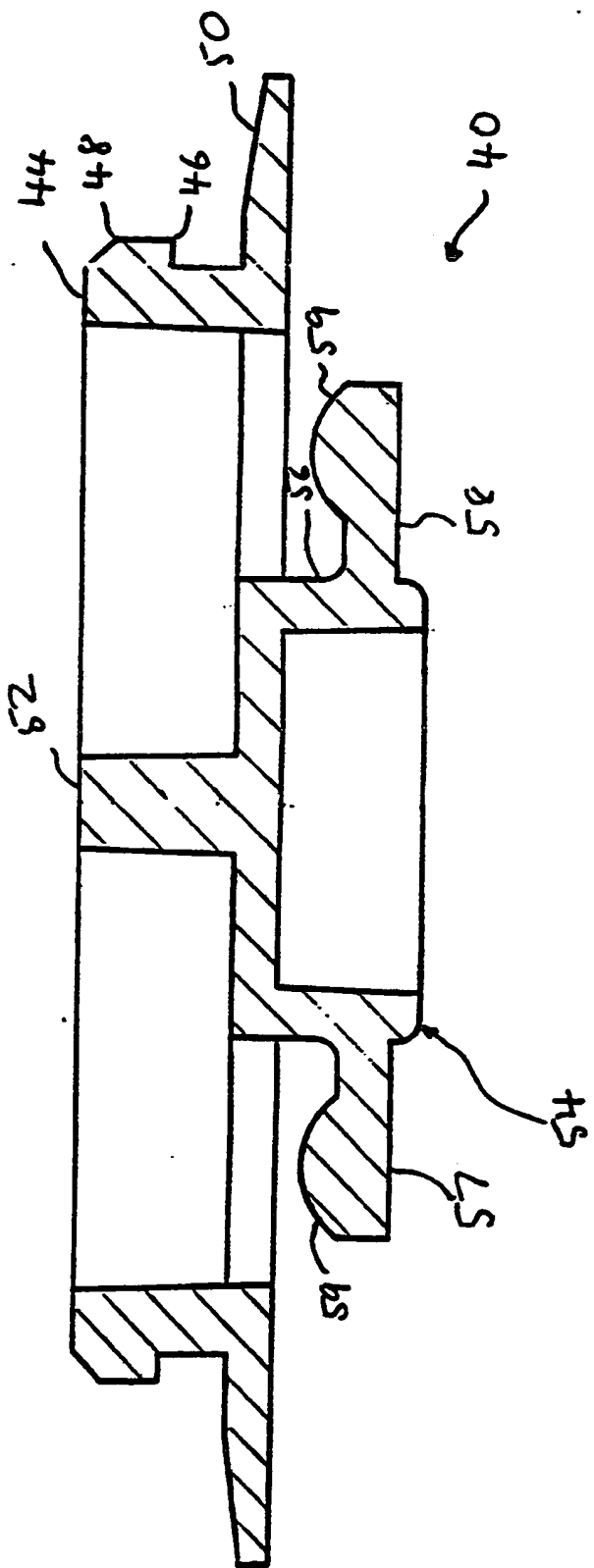


Fig 2.

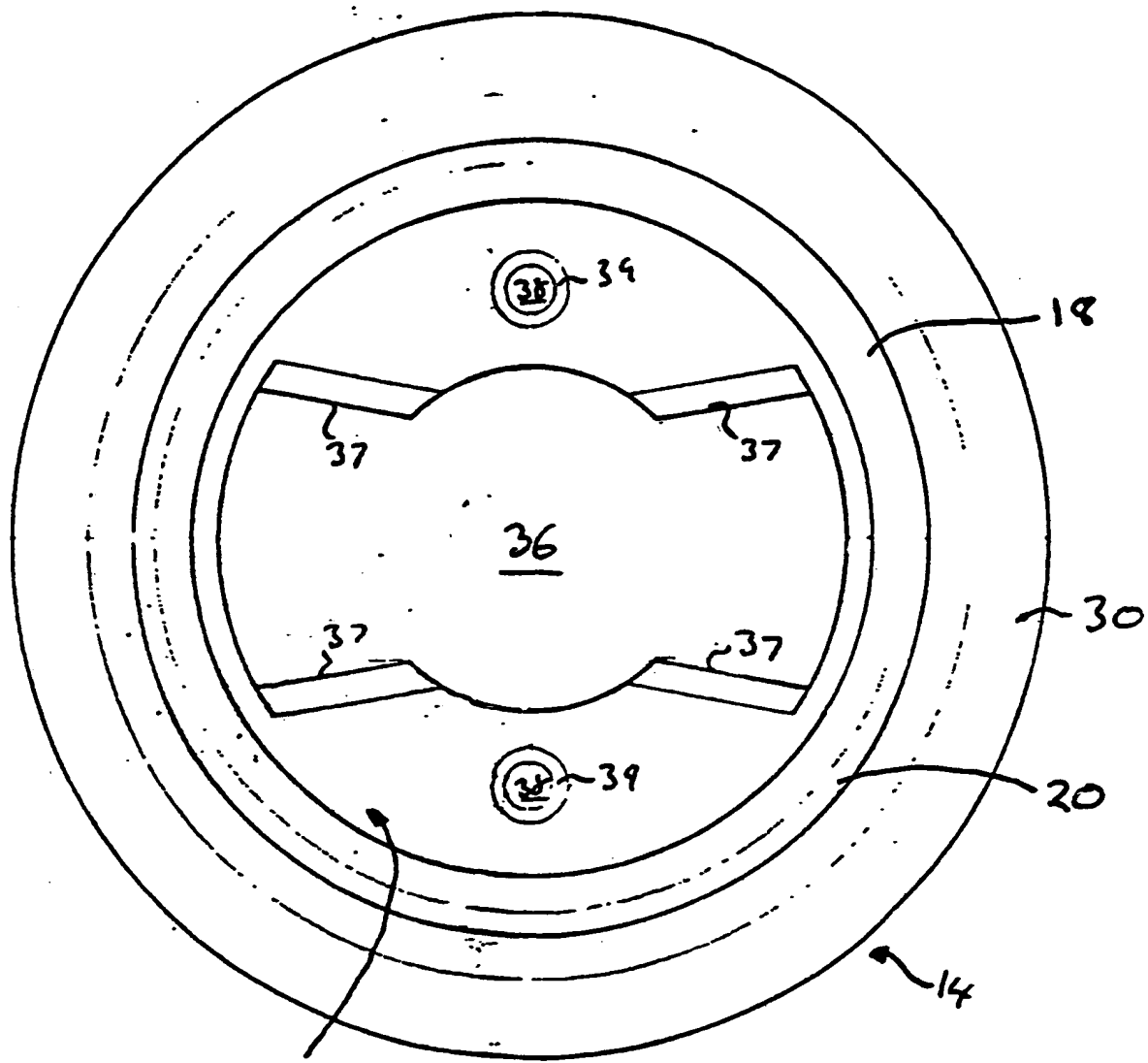


Fig 3.

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Fig 4

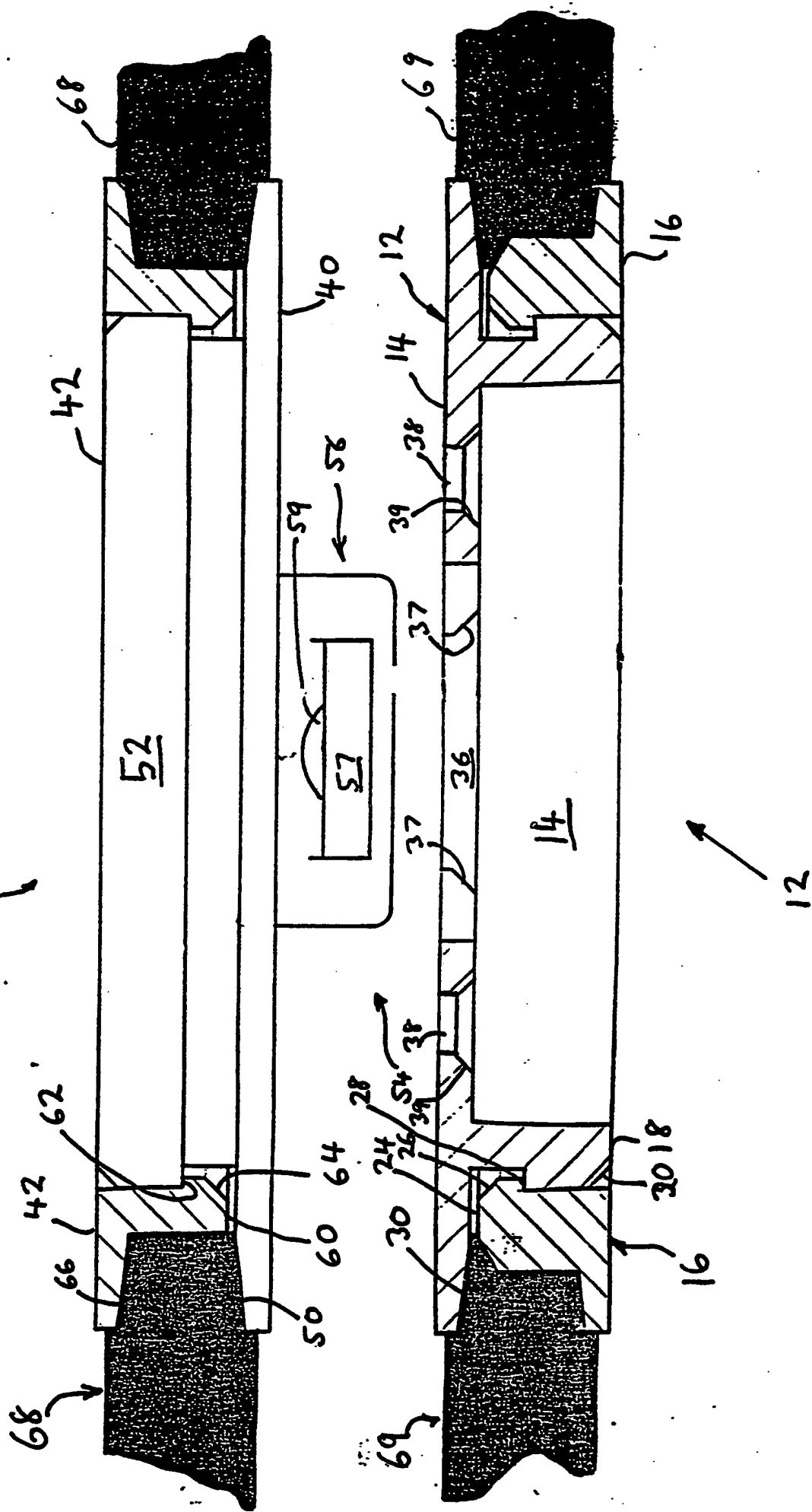


Fig. 5

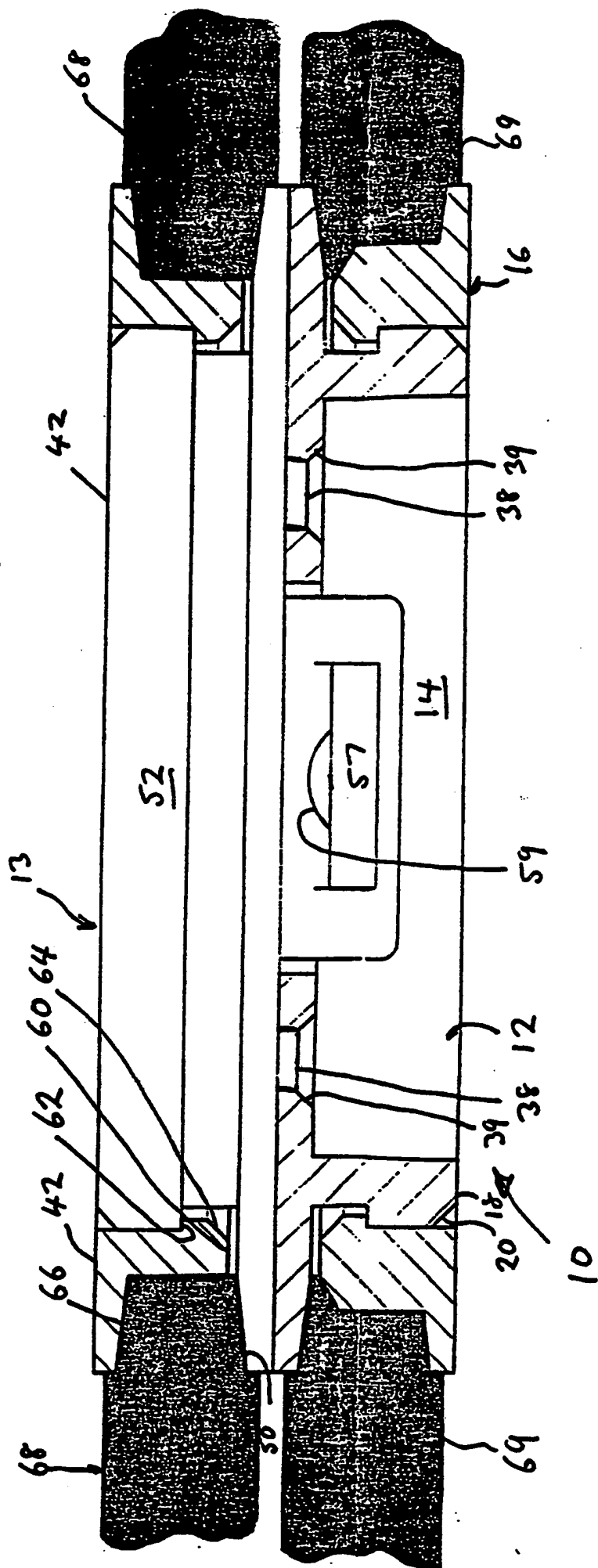
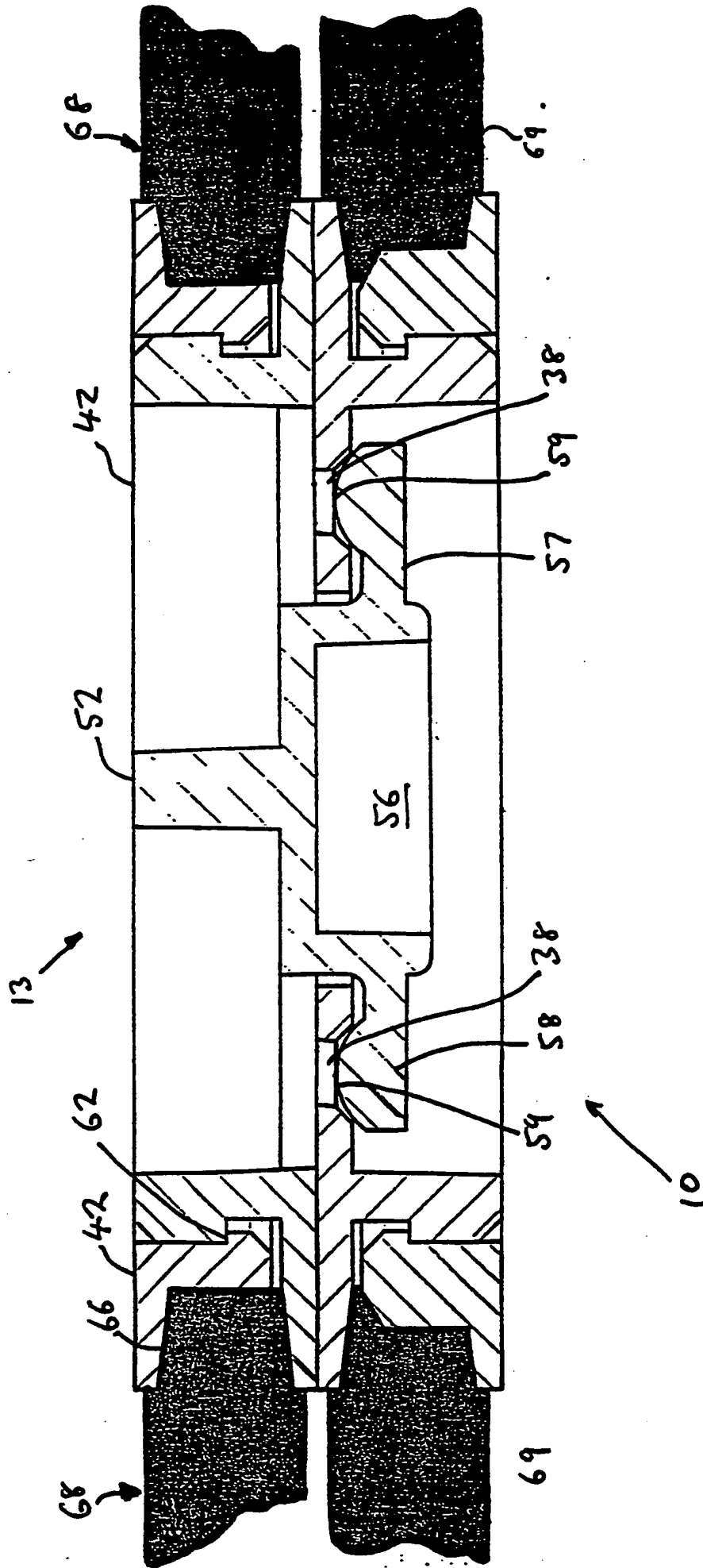


Fig 6.



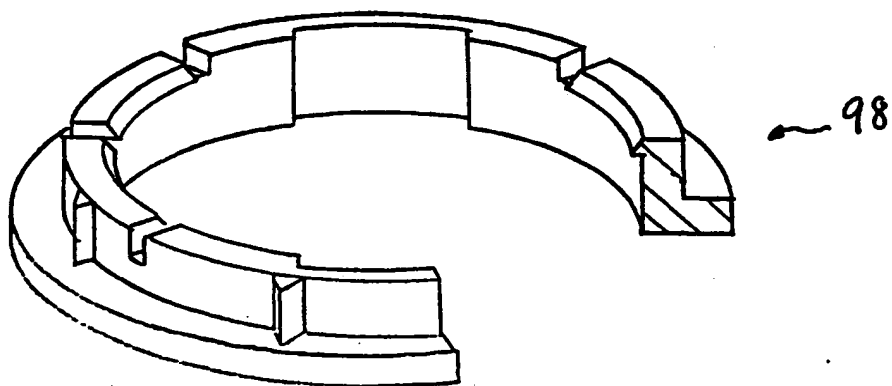
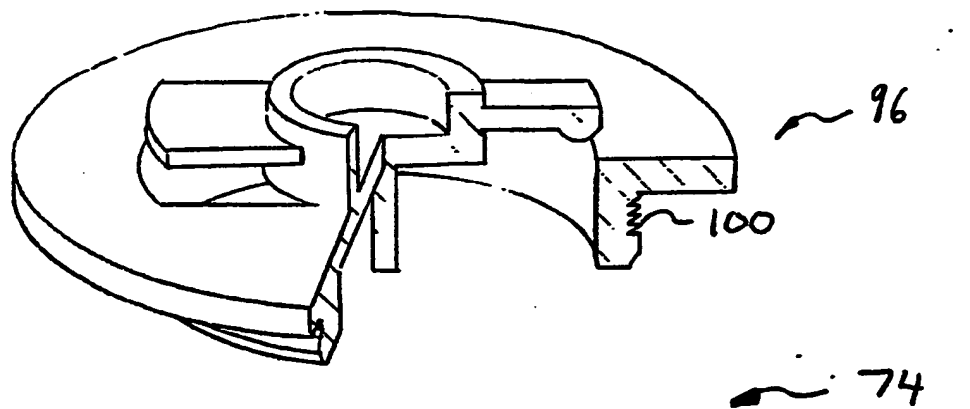
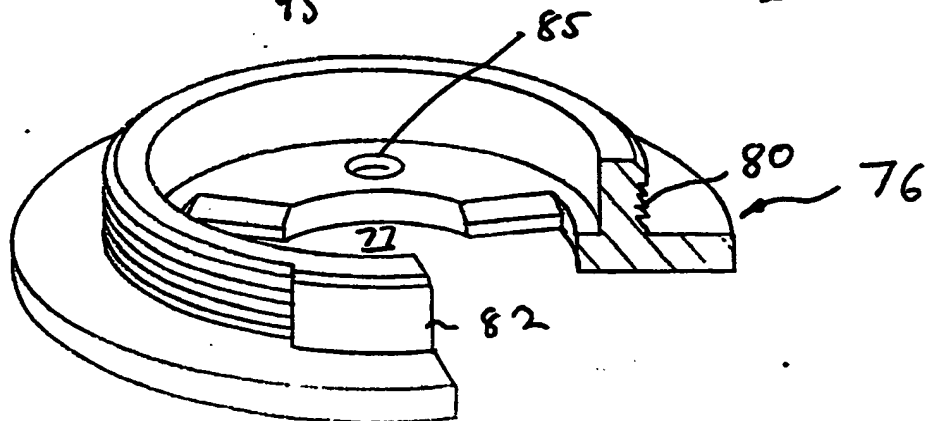
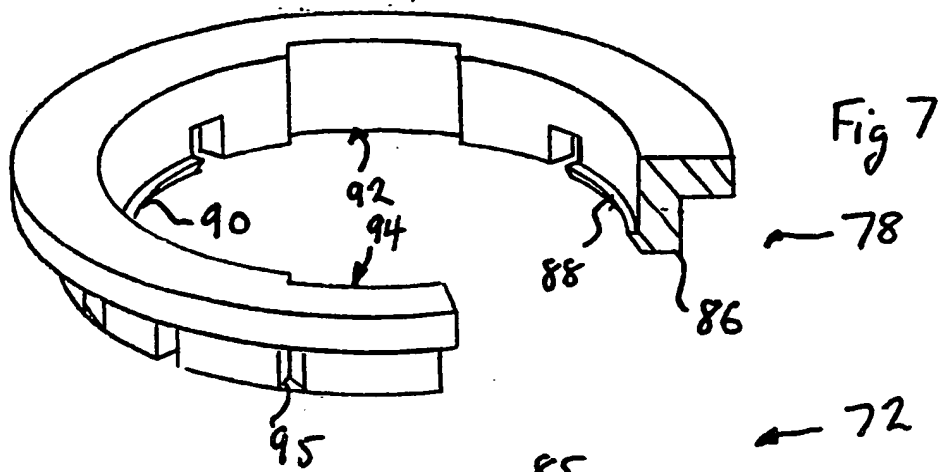


Fig 8

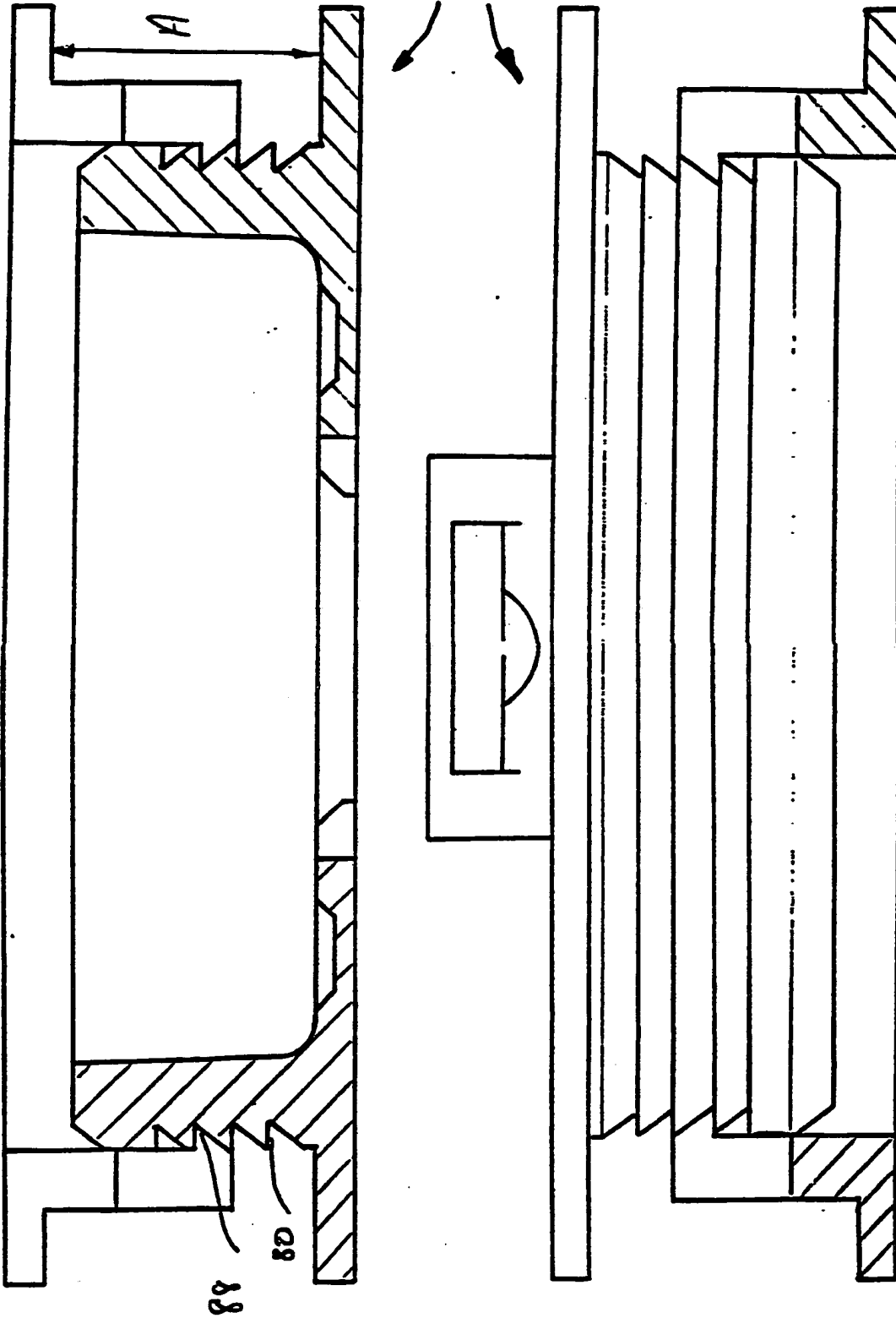


FIG 9.

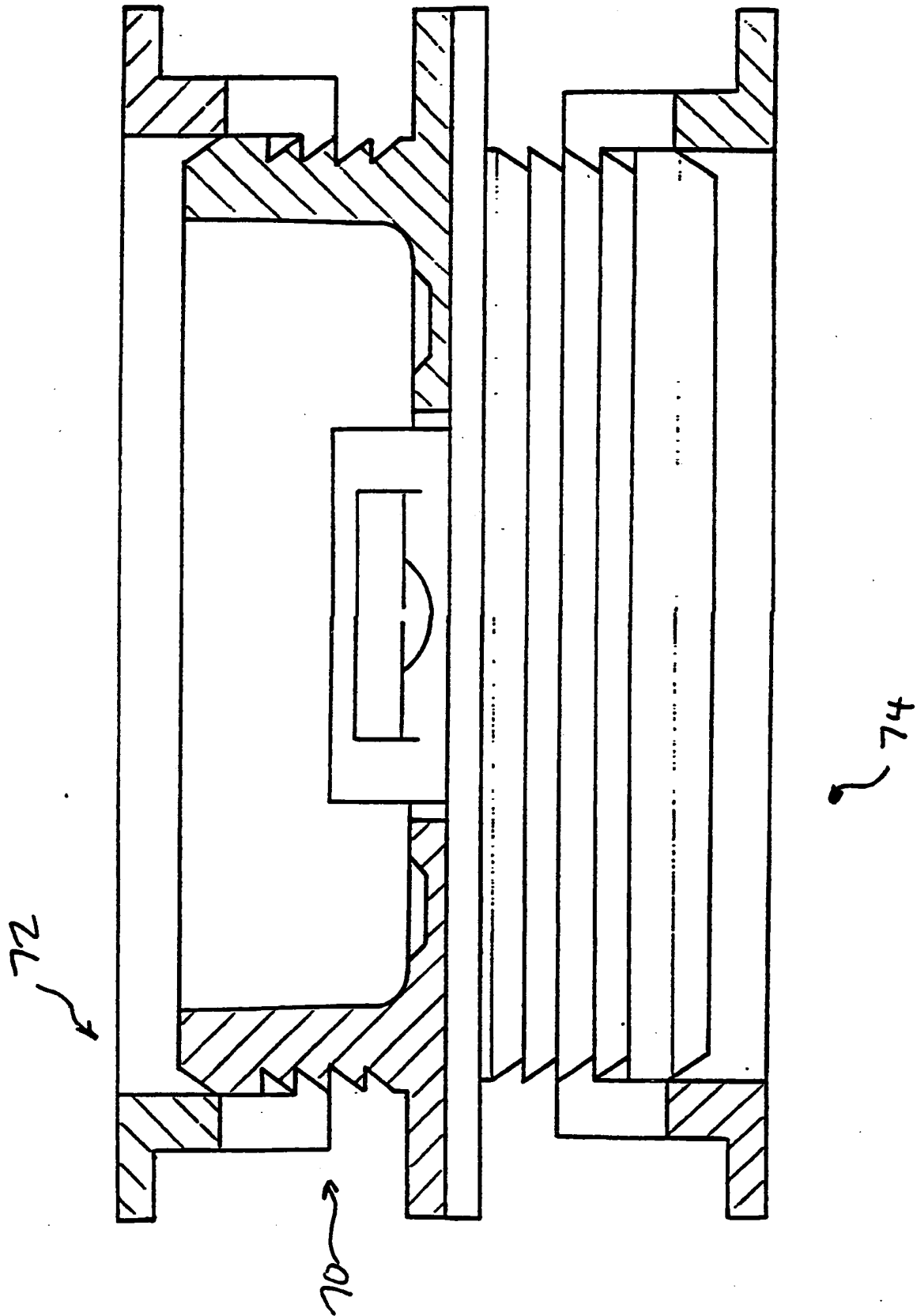


Fig 10

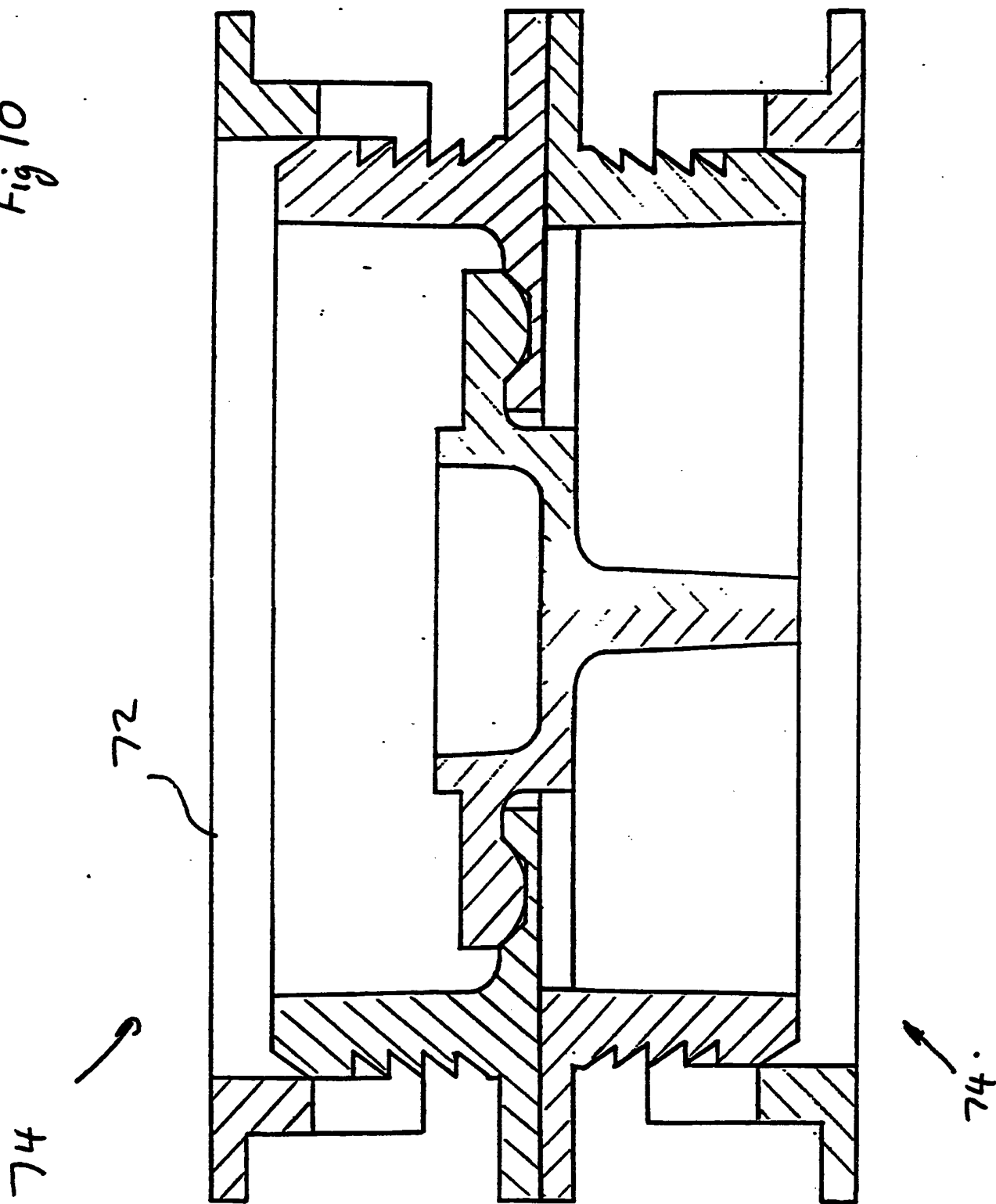


Fig 12

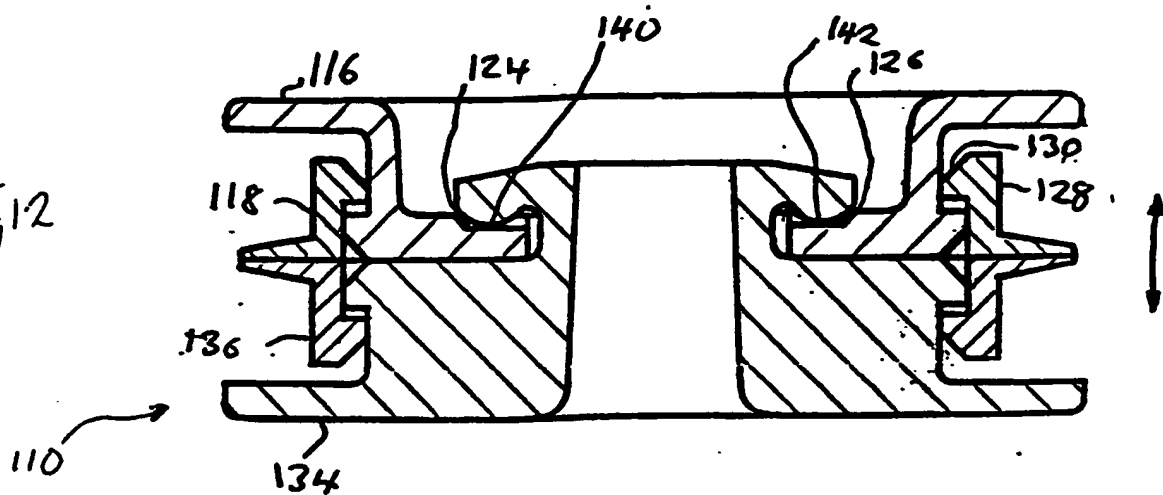
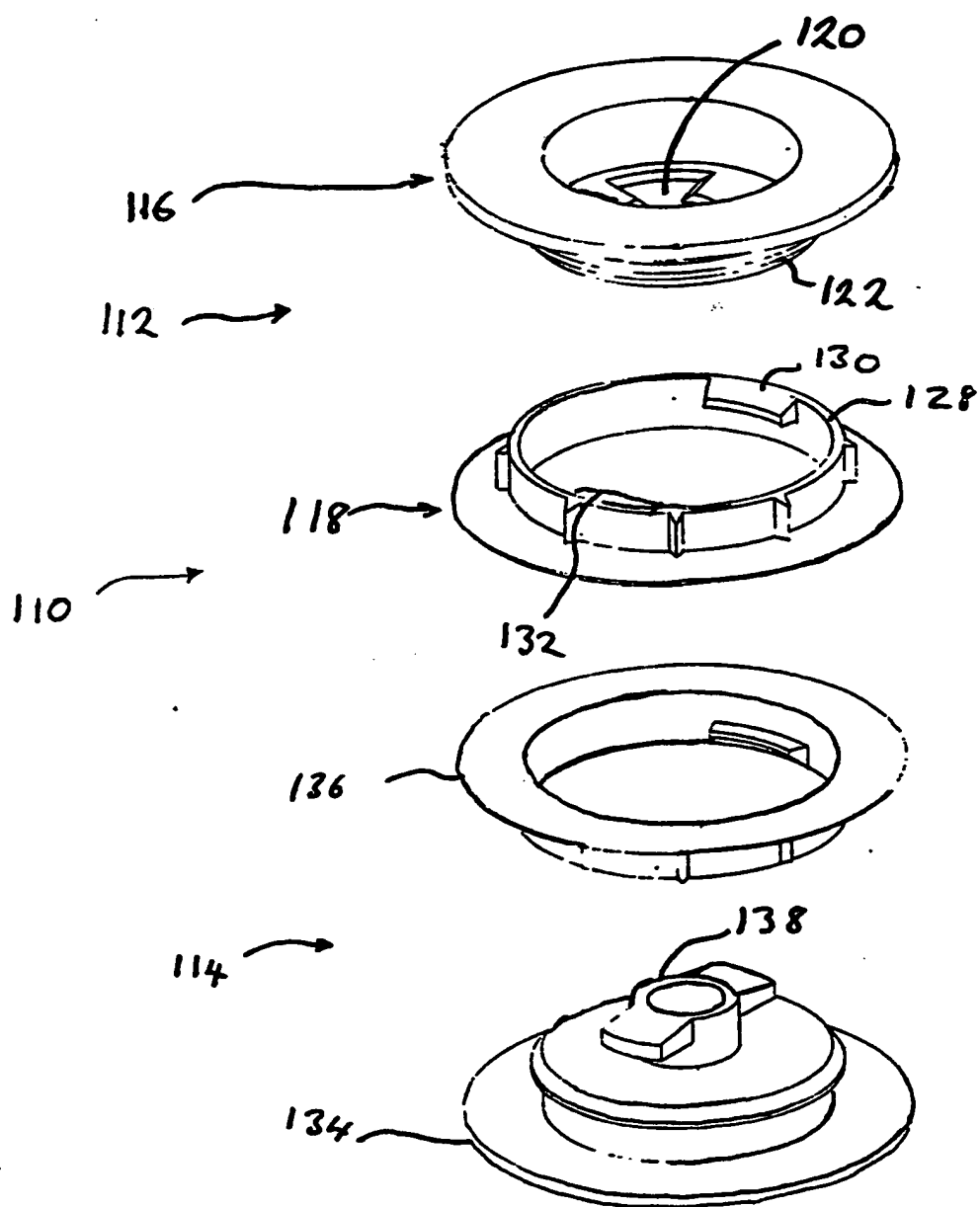


Fig 11



A RELEASABLE CONNECTOR

This invention relates to a releasable connector for releasably connecting two or more members together. Typically, several connectors will be used to connect members such as corrugated cardboard panels to form a box.

A widely used connector for such a purpose is known from British Patent No. 1260331. The connector disclosed in that patent comprises a first retaining piece, which is held in an aperture in a first panel to be connected, by a retaining ring; a second retaining piece, having a detent which is held in an aperture in a second panel to be connected to the first panel by another retaining piece, and a separate turnpiece. The turnpiece comprises a shank which is connected to the first retaining piece prior to use, a separate head at one end of the shank and a resilient projection at the other end of the shank; whereby, in use, the shank interconnects the two retaining pieces and the projection is received by the detent when the turnpiece is rotated. A problem with the known connectors is that it comprises several components which require pre-assembly before use and it is therefore relatively expensive to make or to use.

According to one aspect of the invention there is provided a connector for releasably connecting two members, the connector comprising a first connector part arranged to be fixed to the first member and a second connector part arranged to be fixed to the second member in which the second connector part comprises two portions which are joined to fix the second connector part

to the second member, one of which portions is movable to engage the first connector part to hold the members together. Thus a connector in accordance with the invention has fewer components and therefore requires less pre-assembly than known connectors resulting in economies of construction and use. Typically, the first connector part will also comprise two portions.

The non-movable portion of the second connector part may comprise a retaining element which retains the movable portion in position in relation to the member to which it is to be fitted. Where the first connector part comprises two portions one of the portions may be a retaining element. The two retaining elements are preferably identical.

The two portions of either the first and/or the second connector part may be joined together in a snap-together manner.

The movable portion of the second connector part may be rotatable to engage the first connector part. The other portion of the second connector part may be fixed in relation to the movable portion. The movable portion of the second connector part may be rotatable within the other portion.

The movable portion of the second connector part may extend over a surface of the first member to be connected.

One of the movable portion of the second connector part, or the first connector part may comprise a fastening projection which

engages the other of the second or first connector parts. Preferably, the movable portion of the second connector part comprises the fastening projection. The fastening projection of one component part may comprise a shank which extends towards the other connector part in use.

The fastening projection may be received by an aperture when the first and second connector parts are connected. Preferably the aperture is defined by the first connector part.

The fastening projection may include a portion which extends transverse to the shank. Preferably, the fastening projection comprises two such portions. The said portions may be resilient.

The aperture may be elongate to receive the fastening projection in one orientation. Where the fastening projection comprises at least one portion extending transverse to the shank, the aperture may be shaped to receive the portion(s) of the fastening projection when the projection is in a certain orientation.

One of the first and second connector parts may include a detent which receives a corresponding projection on the other of the first and second connector parts to inhibit relative movement of the parts. Preferably, the first connector part comprises the detent and the second connector part comprises the corresponding projection.

The detent may comprise an aperture or a recess. Preferably a

pair of such apertures or recesses and a pair of corresponding projections are provided. Preferably, the projections are defined by the fastening projection; and more preferably by the aforesaid portion(s) of the fastening projection.

The first connector part and/or the second connector part may be arranged to fit to different thickness members. For example, portions of the first and/or second connector part may be relatively slidable to accommodate different thickness members. Preferably, means are provided for retaining the portions of the first and/or second connector part together in an assembled state. The means may comprise a projection carried by one of the portions and a recess which is defined by the other of the portions. Preferably, the portion carrying the projection is resilient whereby the projection is resiliently biased into the recess to retain the two portions together. Preferably, several spaced recesses or projections are provided whereby the degree of interengagement between the portions is determined by which projection or recess is engaged. The projection may comprise a lip. The recess may extend about the portion. Where the portion is circular, the lip or recess(es) may be circumferential. The lip or recess(es) may be discontinuous. Preferably, several spaced recesses extending about the portion are provided.

A connector in accordance with the invention will now be described, by way of example only, with reference to the accompanying drawings 1 to 12 in which:

Figure 1 is a partial cutaway view of the connector in a disassembled state;

Figure 2 is a cross-section through the movable portion of the connector along line A-A in Fig. 1;

Figure 3 is a plan view of the main body of the first connector point;

Figures 4, 5 and 6 are cross-sections through the connector in use illustrating the connection of two members, also shown in cross-section;

Figure 7 is a partial cutaway of another connector in accordance with the invention in a disassembled state; and

Figures 8, 9 and 10 illustrate the assembly of the connector shown in Fig. 7.

Figure 11 is a view of a further connector in accordance with the invention in a disassembled state; and

Figure 12 is a cross-section through the connector of Fig. 11 when assembled.

The connector 10 shown in Fig. 1 is formed from a resilient plastics material and comprises a first connector part 12 and a second connector part 13. The first connector part 12 consists

of a circular main body 14 and a circular retaining ring 16. The main body 14 has a circular rim 18 having a bevelled edge 20 and a lip 22. The retaining ring 16 has a correspondingly shaped rim 24, comprising bevelled edge 26 and lip 28 whereby the main body 14 and retaining ring 16 can be inserted into a circular aperture in a member, such as a cardboard panel, from either side of the member and then resiliently snapped together so that the first part of the connector is fixed to the member as shown in Fig. 4. Flanges 30, 32 on the main body 14 and retaining ring 16 respectively prevent axial movement of the first connector part through the member. Splines 34 on the outer surface of rim 24 of the retaining ring 16 bite into the material of the member at the surface of the aperture and prevent rotational movement of the first connector part 12 relative to the member.

The main body 14 has a central area 35 which defines an elongate central aperture 36 having bevelled sides 37. Two smaller apertures 38 (the aforesaid "detent") having bevelled sides 39 are arranged on either side of the central aperture 38.

The second connector part 13 comprises a circular movable portion 40 and a circular retaining ring 42. The movable portion 40 comprises rim 44, including lip 45 and bevelled edge 48, flange 50, manually grippable handle 52 and fastening projection 54.

The fastening projection 54 comprises a shank 56 and portion 57, 58 which extend transverse to the shank 56. The portions 57, 58 have hemi-spherical projections 59 on their upper surfaces.

The retaining ring 42 has a corresponding rim 60 which comprises lip 62 and bevelled edge 64. The retaining ring 42 also comprises flange 66.

In use, the movable portion 42 and retaining ring 44 are snap-fitted together, through an aperture formed in a member such as a cardboard panel, into the position as shown in Fig. 4.

To use the connector 10, the two connector parts 12 and 13 are assembled in situ in apertures, (which may be for example cut or stamped) defined by two corrugated cardboard panels 68, 69 as shown in Fig. 4. The movable portion 40 of the second connector part 13 is rotated, by means of handle 52, so that the portions 57, 58 of the fastening projection 54 of the second connector part 13 are aligned with the elongate aperture 36 of the first portion 12. The two connector parts 12, 13 are then brought together, so that the fastening projections 54 is received in the aperture 36, resulting in the position shown in Fig. 5.

The movable portion 40 is then rotated again through about 90° and the portions 58, 59 are resiliently deflected by the bevelled edges 37 of the aperture 36 and ride over the surface 35 until they are received by the apertures 38 as shown in Fig. 6. In that position the two panels 68, 69 are securely held together by the connector 10 but may be easily separated by manipulating the connector 10 into the Fig. 5 position and then moving the panels apart.

It will be appreciated that the design of the connector can be varied considerably whilst remaining within the scope of the invention. For example, the fastening projection may comprise only one portion 57 extending from the shank 56. Such a connector would have a correspondingly-shaped aperture to receive the fastening projection.

The depth of the rims 18, 24, 44 and 60 may be altered to suit different thicknesses of members. For example the rims may be extended to fit two ply corrugated cardboard or reduced to fit die cut corrugated cardboard.

The connector 70 shown in a disassembled state in Fig. 7 is also formed from a resilient plastics material and comprises a first connector part 72 and a second connector part 74.

The first connector part 72 comprises a circular main body 76 and a circular retaining ring 78. The main body 76 defines a central aperture 77 and has a toothed rim 80 which includes positioning lugs 82, 84 (not shown). Two recesses 85, 85a (obscured) are provided either side of the central aperture 77. The retaining ring 78 comprises a discontinuous rim 86 which includes lipped portions e.g 8, 90 and recesses 92, 94 and outwardly-facing splines e.g 95. The recesses 92, 94 are shaped to receive the positioning lugs 82, 84 when the first connector part 72 is assembled. The first connector part is assembled by bringing the main body 76 and retaining ring 78 into engagement through a hole

created for example by stamping or cutting in a member such as a corrugated cardboard panel. As the main body and retaining ring are brought together the lipped portions e.g 88, 90 are resiliently deflected by the teeth of the toothed rim so that they slide over the teeth. The degree of engagement of the retaining ring and main body is determined by the thickness of the member. When the retaining ring and main body are fully interengaged, their separation is inhibited by the teeth of the toothed rim 80 which engage the lipped portion 88. The splines 95 prevent rotation of the first connector part in use.

The second connector part 74 comprises movable portion 96 and retaining ring 98. The retaining ring 98 is identical to the retaining ring 78 of the first connector part and may therefore be produced from the same moulding which results in economies in production of the connector.

The movable portion 96 is similar to the movable portion 40 of the connector shown in Figs. 1-6 and previously described above, the principle difference being its toothed rim 100. The second connector part 74 is assembled in a similar manner to the first connector part, the lipped portions of the retaining ring being deflected by the toothed rim 100 as the two components are brought into engagement and the lipped portions thus being held by the toothed rim to prevent separation of the components.

The connection of the first and second connection parts is shown in Figs. 8-10, and in Figs. 4-6, which also illustrate the

engagement of the lipped portions of the retaining rings 78 and 98 with the toothed rims 80 and 100 respectively of the main body 76 and movable portion 96. The dimension A in Fig. 8 will be reduced when the connector is used with relatively thin members and increased when the connector is used with relatively thick members.

The connector 70 has certain advantages over the connector 10:

Firstly, as mentioned above the connector 70 can be produced from three moulds, which gives economies in production and in use in that a user is required to stock less components.

Second, each connector part is able to accommodate different thicknesses of member.

Third, the discontinuous rim of the retaining ring 98 grips the movable portion 96 less rigidly than does the snap fit retaining ring 42. Thus the retaining ring is able to accommodate a wider range of moulding tolerances than the snap fit retaining ring which requires an accurate fit with the movable portion.

A further connector 110 is shown in exploded form in Fig. 11, which is generally similar construction to the connector 70. The connector 110 comprises a first connector part 112 and a second connector part 114.

The first connector part 112 comprises a circular main body 116

and a circular retaining ring 118. The main body 116 defines a central aperture 120 and has a toothed rim 122. Two recesses 124, 126 (both obscured) are defined on either side of the central aperture 120.

The retaining ring 118 comprises a rim 128 which forms lipped portions 130,132. The first connector part 112 is assembled by bringing the main body 116 and retaining ring 118 into engagement through a hole created in a member for example a corrugated cardboard panel by cutting or stamping the lips, 130,132 snapping over toothed rim 122. It will be noted that the first connector part 112 differs of connector 110 from the first connector part 72 of connector 70 described above in that the main body 116 and retaining ring 118, in use, are as the opposite sides of the member to the corresponding components 76, 78 of the other connector 70.

The second connector part 114 comprises movable portion 134 and retaining ring 136. The retaining ring 136 is identical to the retaining ring 118 of first connector part 11.

The moving part 134 is of similar construction to the movable portions 96 and 40 of the connectors 70 and 10 previously described and in use is fixed to a member in a similar manner. However it will be noted that, in use, the movable portion 134 and the retaining ring 136 when assembled are on opposite sides of the member to the corresponding components of connector 70. Moving part 134 also comprises a fastening projection 138 which

includes portions 140, 142 which are received by the apertures 124, 126 respectively when the connector is assembled.

Connector 110 is shown assembled in Fig. 12. The connector 110 is advantageous in applications where the connector is subjected to extreme separation forces i.e in the direction of the arrow in Fig. 12.

CLAIMS

1. A connector for releasably connecting two members, the connector comprising a first connector part arranged to be fitted to the first member and a second connector part arranged to be fitted to the second member in which the second connector part comprises two portions which are joined to fix the second connector part to the second member, one of which portions is movable to engage the first connector part to hold the members together.
2. A connector according to claim 1 in which the first connector part comprises two portions.
3. A connector according to claim 2 in which the two portions of the first and/or second connector part fit together in a snap-together manner.
4. A connector according to claim 1, 2 or 3 in which the movable portion of the second connector part is rotatable to engage the first connector part.
5. A connector according to any preceding claim in which in use the non-movable portion of the second component part is fixed in relation to the movable portion.
6. A connector according to any preceding claim in which movable portion of the second connector part is rotatable within

the non-movable portion.

7. A connector according to any preceding claim in which one of the movable portion of the second connector part, or the first connector part comprises a fastening projection which engages the other of the first or second connector parts.

8. A connector according to claim 7 in which the movable portion of the second connector part comprises the fastening projection.

9. A connector according to claim 7 or 8 in which the projection comprises a shank which extends towards the other connector part in use.

10. A connector according to any one of claims 7 to 9 in which the fastening projection is received by an aperture when the first and second connector parts are connected.

11. A connector according to claim 10 in which the aperture is defined by the first connector part.

12. A connector according to any one of claims 9 to 11 in which the fastening projection includes a portion which extends transverse to the shank.

13. A connector according to any one of claims 10 to 12 in which the aperture is elongate to receive the fastening projection in

one orientation.

14. A connector according to any preceding claim in which one of the first and second connector parts includes a detent which receives a corresponding projection on the other of the first and second connector parts to inhibit relative movement of the parts.

15. A connector according to claim 14 in which the first connector part comprises the detent and the second connector part comprises the corresponding projection.

16. A connector according to any preceding claim in which the first connector part and/or the second connector part are arranged to fit to members of different thicknesses.